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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/849,966 | 05/04/2001 | Hiroyuki Hyodo | 2803-65479 | 9327 |

7590 05/14/2004

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| EXAMINER |
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RESAN, STEVAN A

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| ART UNIT | PAPER NUMBER |
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1773

DATE MAILED: 05/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/849,966

Applicant(s)

HYODO ET AL.

Examiner

Stevan A. Resan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-9,11-18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) 14-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-9,11-13, 18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11 December 2003 has been entered.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1,2,4-9,11-13,18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Veerasamy et al US 5858477 taken in view of Veersamy et al US 5,303,225 and Takahashi et al JP 10-143836 for the reasons of record.
4. Applicant's arguments filed 11 December 2003 have been fully considered but they are not persuasive.

Applicants have amended claims 4, 11 and 20 to also include the limitation that the carbonaceous layer is formed by a Filtered Cathodic Arc process and argue that the present claims all now require the formation of the carbonaceous layer by a Filtered Cathodic Arc process. However process limitations carry no weight in article claims unless they can be shown to produce a patentable article.

Applicants argue that the selective incorporation of nitrogen in the '477 patent is only intended to vary the electrical conductivity. However if it is obvious to add

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nitrogen for one reason it is obvious to add for all reasons. Applicants also argue that the nitrogen is doped and therefore there is apparently no gradual increase in the nitrogen concentration from the substrate side to the upper surface.

However it is the examiner's position that doping inherently distributes the nitrogen in an inclined concentration gradually increasing from a bottom surface side to a top surface side in the carbonaceous protective layer since nitrogen is impacting the upper surface. Since not all nitrogen atoms will have the same energy, the most energetic will penetrate the farthest into the surface while a declining number will penetrate less far. Depending upon the thickness of the carbon layer this will result in a gradually increasing concentration from the bottom surface to the top surface or from the point of maximum penetration (which may be half the thickness) to the upper surface.

Applicants also argue that in the '225 patent nitrogen is doped in an upper portion of the DLC layer and that there is no "gradual increase". However it would have been obvious to one of ordinary skill in the art to have an inclined concentration gradually increasing from a bottom surface side to a top surface side in the carbonaceous protective layer (as taught by Takahashi- See [0045]) for the reasons of record or which occurs as explained above.

Applicants also argue that the "large" amount of nitrogen doped into the DLC layer in the '226 patent causes a reduction in hardness however there is no evidence of record to support this argument and no criticality of the nitrogen concentration asserted.

Applicants agree that Takahashi JP'836 does teach that nitrogen may be contained in a concentration gradient in the thickness direction of the carbon layer with the concentration highest at the upper surface but argue that the carbon layer is formed by a different process and that when the carbon layer is produced at a reduced thickness of 5 nm or less high durability cannot be obtained. However a thickness limitation is not claimed nor any comparative data to support this argument.

Finally applicants argue that the adhesion between the carbon layer and the lubricant layer can be improved while the hardness is maintained. However the examiner notes that applicants' favorable results were derived from embodiments having more specific structure than presently claimed i.e. specific simultaneous ranges of thickness, nitrogen content and contact angle of the upper surface.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stevan A. Resan whose telephone number is 571-272-1513. The examiner can normally be reached on Tues-Thurs from 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau, can be reached at 571-272-1516. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read "Stevan A. Resan". The signature is fluid and cursive, with a large, stylized "R" at the end.

STEVAN A. RESAN
PRIMARY EXAMINER